ABSTRACT OF THE DISCLOSURE

A method and apparatus for MIG welding is disclosed. When in an ac mode the output is unbalanced, or the balance may be controlled. The balance may be controlled to provide a desired deposition rate and /or to obtain a desired dilution. The frequency may be any frequency, for example 30 Hz, 60 Hz, 90 Hz, or more. The weld path may have groove with angle of less than 50 degrees. A consumable, cored, wire may be used, and provide at rates of 30 or 35 pounds per hour using a single arc. In various embodiments the balance may have a negative portion of at least 1.5 times the positive portion. The process may be started using an extended negative portion, for example 0.5 or 0.75 seconds.